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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/632,495	07/31/2003	Brian K. Aegerter	6884-66364	4402

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EXAMINER

VINH, LAN

ART UNIT PAPER NUMBER

1765

DATE MAILED: 10/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/632,495

Applicant(s)

AEGERTER ET AL.

Examiner

Lan Vinh

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34, 42 and 52-71 is/are pending in the application.
- 4a) Of the above claim(s) 25, 42 and 60-64 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11, 13-24, 26-41, 43-59 and 65-71 is/are rejected.
- 7) ☒ Claim(s) 10, 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>12004</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 65 is objected to because of the following informalities: in line 5 of claim 65, "f" appears to be a typographical error, the examiner suggests replacing "f" with --of--.
Appropriate correction is required.

Election/Restrictions

2. Applicant's election without traverse of Group I, claims 1-24, 26-41, 43-59, 65-79 in the reply filed on 9/19/2005 is acknowledged. However, it is noted that claims 35-41, 43-51, 72-79 have been cancelled in a preliminary amendment filed on 7/31/2003

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-9, 11, 16-22, 65-71 are rejected under 35 U.S.C. 102(e) as being anticipated by Miki et al (US 6,325,081)

Art Unit: 1765

Miki discloses a method for washing wafer 102/workpiece the workpiece having a front/first side, an opposing back/second side, and a peripheral edge defined between the first and second sides, the method comprising:

placing the workpiece in a reaction chamber 101 that includes a first chamber portion receiving the first side of the wafer/workpiece and a second chamber portion receiving the second side of the wafer/workpiece (col 7, lines 25-27; fig. 1)

supplying a first fluid 103 to the first chamber portion to expose the front/first side to the first fluid while excluding at least a major portion of the second side from exposure to the first fluid (col 7, lines 25-30; fig. 1)

supplying a second fluid 104 to the second chamber portion to expose the back/second side to the second fluid, wherein at least one of the first and second fluids comprises an etchant for removal an oxide film from an exposed surface portion of the workpiece (col 7, lines 25-30; col 8, lines 59-65)

Regarding claims 2, 18, 67, Miki discloses that first and second fluids are supplied concurrently to the front/first and back/second sides of the wafer/workpiece (col 7, lines 39-41)

Regarding claim 3, Miki discloses the first and second fluids are supplied at differing time periods (table 5)

Regarding claims 4-5, 71, fig. 11 of Miki shows that the edges on the front and back of the wafer are exposed to the fluid

Regarding claim 6, Miki discloses using inert gas/nitrogen with the fluid (col 10, lines 39-41)

Art Unit: 1765

Regarding claim 7, Miki discloses performing a washing/aqueous rinse (col 10, lines 1-5)

Regarding claims 8-9, Miki discloses using an etchant comprises HF acid supplied at a level and hydrogen peroxide/oxidizing agent (col 8, lines 43-45)

Regarding claim 11, Miki discloses using ozone with the HF (col 9, lines 55-56)

Regarding claim 16, fig. 11 of Miki shows that the first fluid is excluded from a major portion of the back/second side, the first fluid can be removed from outlets in the chamber proximate to the edge of the wafer

Regarding claim 17, fig. 11 of Miki also shows that the front/first side of the wafer is sealed from the back/second side

Regarding claims 19, 22, fig. 11 of Miki shows that the chamber has separate portions/members in a housing

Regarding claims 20-21, 66, fig. 11 of Miki shows that the chamber members are rotated/spun together on a substrate holder while supplying fluids to the wafer

Regarding claim 68, Miki discloses performing a step of washing/rinsing the wafer (col 10, lines 4-5)

Regarding claim 69, Miki discloses the step of spinning the wafer to dry the wafer (col 10, lines 40-45)

Regarding claim 70, Miki discloses spraying the wafer with inert gas (col 10, lines 40-43)

Art Unit: 1765

5. Claims 26-27, 31-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Miki et al (US 6,325,081)

Miki discloses a method for washing wafer 102/workpiece the workpiece having a front/first side, an opposing back/second side, and a peripheral edge defined between the first and second sides, the method comprising:

placing the workpiece in a reaction chamber 101 that includes a first chamber portion receiving the first side of the wafer/workpiece and a second chamber portion receiving the second side of the wafer/workpiece (col 7, lines 25-27; fig. 1)

supplying a first fluid 103 to the first chamber portion to expose the front/first side to the first fluid while excluding at least a major portion of the second side from exposure to the first fluid (col 7, lines 25-30; fig. 1), the first fluid comprises an etchant for removal an oxide film from an exposed surface portion of the workpiece (col 7, lines 25-30; col 8, lines 59-65)

Regarding claim 27, Miki discloses exposing the edge of the back/second side to the first fluid (fig. 1)

Regarding claim 31, Miki discloses using an etchant comprises HF acid supplied at a level to remove oxide (col 8, lines 43-65)

Regarding claim 32, fig. 11 of Miki shows that the chamber has separate portions/members in a housing

Regarding claims 33-34, fig. 11 of Miki shows that the chamber members are rotated/spun together on a substrate holder while supplying fluids to the wafer

Art Unit: 1765

6. Claim 52 is rejected under 35 U.S.C. 102(e) as being anticipated by Miki et al (US 6,325,081)

Miki discloses a method for washing wafer 102/workpiece the workpiece having a front/first side, an opposing back/second side, and a peripheral edge defined between the first and second sides, the method comprising:

placing the workpiece in a reaction chamber 101 (col 7, lines 25-27; fig. 1)

supplying a first fluid 103 to the first chamber portion to expose the front/first side to the first fluid while excluding at least a major portion of the back/second side from exposure to the first fluid (col 7, lines 25-30; fig. 1)

7. Claim 53-55 are rejected under 35 U.S.C. 102(e) as being anticipated by Miki et al (US 6,325,081)

Miki discloses a method for washing wafer 102/workpiece the workpiece having a front/first side, an opposing back/second side, and a peripheral edge defined between the first and second sides, the method comprising:

placing the wafer/workpiece in a reaction chamber 101 that includes a first chamber portion receiving the first side of the wafer/workpiece and a second chamber portion receiving the second side of the wafer/workpiece, a perimeter portion receiving the edge of the wafer, a fluid outlet 103 proximates the edge of the wafer (col 7, lines 25-27; fig. 1)

supplying a first fluid 103 to the first chamber portion to expose the front/first side to

Art Unit: 1765

the first fluid while excluding at least a major portion of the back/second side from exposure to the first fluid, the first fluid flow through the outlet 103 in the edge portion of the wafer (col 7, lines 25-30; fig. 1)

Regarding claims 54-55, Miki discloses exposing the edge of the wafer to the first and second fluids (fig. 1)

8. Claim 56-59 are rejected under 35 U.S.C. 102(e) as being anticipated by Miki et al (US 6,325,081)

Miki discloses a method for washing wafer 102/workpiece the workpiece having a front/first side, an opposing back/second side, and a peripheral edge defined between the first and second sides, the method comprising:

placing the wafer/workpiece in a reaction chamber 101 that includes a first chamber portion receiving the first side of the wafer/workpiece and a second chamber portion receiving the second side of the wafer/workpiece, a perimeter portion receiving the edge of the wafer (col 7, lines 25-27; fig. 1)

supplying a first fluid 103 to the first chamber portion to expose the front/first side to the first fluid while excluding at least a major portion of the back/second side from exposure to the first fluid, the first fluid flow through the outlet 103 in the edge portion of the wafer (col 7, lines 25-30; fig. 1), the fluid flows out through the outlet in the edge of the chamber (fig. 11)

Regarding claim 57, Miki discloses that the back/second side of the wafer is excluded from the first fluid (fig. 1)

Art Unit: 1765

Regarding claim 58, fig. 11 of Miki also shows that the front/first side of the wafer is sealed from the back/second side

Regarding claim 59, Miki discloses that first and second fluids are supplied concurrently to the front/first and back/second sides of the wafer/workpiece (col 7, lines 39-41)

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miki et al. (US 6,325,081) in view of Linn et al (US 2002/0189640)

Art Unit: 1765

Miki method has been described above. Unlike the instant claimed inventions as per claims 13-14, Miki fails to disclose using the etchant comprises sulfuric, hydrogen peroxide/ HF and HCl

Linn discloses a method for wafer cleaning comprises the step of using etchant comprises sulfuric and hydrogen peroxide/ HF and HCl (col 2, paragraph 0012-0013)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Miki method by using the etchant as per Linn because Linn discloses that etchants comprises sulfuric and hydrogen peroxide/ HF and HCl are conventional employed cleaning solution to clean silicon wafer (col 2, paragraph 0012)

11. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miki et al. (US 6,325,081) in view of Hara et al (US 6,451,696)

Miki method has been described above. Unlike the instant claimed invention as per claim 15, Miki fails to disclose using the etchant comprises HF and nitric acid

Hara discloses a method for reclaiming wafer comprises the step of using etchant comprises HF and nitric acid (col 3, lines 25-30)

One skilled in the art at the time the invention was made would have found it obvious to modify Miki method by using etchant comprises HF and nitric acid as per Hara because Hara discloses that a mixture of HF and nitric acid is useful for removal of surfaces layers having complicated film configuration and composition (col 3, lines 25-28)

12. Claims 23-24, 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miki et al. (US 6,325,081) in view of Linn et al (US 2002/0189640)

Miki method has been described above. Unlike the instant claimed inventions as per claims 23-24, 28, Miki fails to disclose using the first fluid/etchant to partially etch the metal film of copper from the front/first side of the wafer

Linn discloses a method for wafer cleaning comprises the step of using an etchant comprises of HF to remove copper from a wafer surface (col 1, paragraph 0005)

Hence, one skilled in the art at the time the invention was made would have found it obvious to employ Miki method to partially remove copper in view of Linn teaching because Linn discloses that an aqueous solution of HF and HCl enhances metal removal (paragraph 0005)

13. Claims 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miki et al. (US 6,325,081) in view of Ohkawa (US 6,326,657)

Miki method has been described above. Unlike the instant claimed inventions as per claims 29-30, Miki fails to disclose treating the first, second side and perimeter edge of the wafer with the first and second fluid to remove cobalt contaminants

Ohkawa discloses a method for manufacturing semiconductor device comprises the step of removing cobalt from a silicon surface with HF (col 7, lines 36-39)

Since Miki discloses removing metallic contaminants in his method of cleaning using fluid such as HF (col 10, lines 15-20), one skilled in the art at the time the invention was made would have found it obvious to employ Miki method to remove cobalt

Art Unit: 1765

contaminants in view of Ohkawa teaching because Ohkawa discloses that the cobalt film is removed using HF (col 7, lines 36-38)

Allowable Subject Matter

14. Claims 10, 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.



LV

October 13, 2005